

# PATENT SPECIFICATION

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## (54) SOAP- OR SURFACTANT-FILLED PAD

(71) We, MINNESOTA MINING AND MANUFACTURING COMPANY, a corporation organized and existing under the laws of the State of Delaware, United States of America, of 3M Center, Saint Paul, Minnesota 55101, United States of America, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

The invention relates to pads of non-woven fibres containing a solid core of soap or a surfactant material, particularly for use in bathing the human body.

Since his very beginning, man has sought some means for cleansing his body. Ancient Romans and Greeks first soaked themselves in swimming pool-size baths contained in ornate bath houses and then scraped their bodies with metal or bone strigils to cleanse and stimulate their skin. From about the 18th century onward, Finnish people, while steaming in a sauna, beat themselves with birch twigs to stimulate circulation and cleanse their skin. Modern bathing involves applying soap, generally in bar form, while stimulating the skin with a washcloth or sponge.

It has been found to be somewhat awkward, however to apply soap with a washcloth or sponge since it involves the use of two separate articles, one being extremely slippery when wet and tending to slide from the user's hands quite easily. Wrapping the washcloth around the soap may be a temporary solution but it is not completely satisfactory. Similarly, making a pouch in the sponge to contain the bar of soap leaves the sponge permanently saturated with the soap and slimy after its initial use. Sewing a bar of soap between two plies of washcloth likewise produces an article that is permanently slimy after use.

Soap-containing, pad-like articles which may, at first, appear to satisfy the need described above but are generally intended for other uses, such as scouring pans, buffing, polishing, and abrading, are not suited for use in bathing the human body. Most are too harsh for use on human skin. Others would rapidly

lose their entire loading of soap. Some contain corn meal, wood flour, or fine sawdust to slow the dissipation of soap from the pad during use which additives will leave an undesirable residue of these particles on the skin. It is known to heat seal a bar of soap between two batts of non-woven thermoplastic fibres to produce an article which may be useful for scouring pans but which would have a harsh unattractive seam that would be stiff and scratchy and could injure the skin.

The present invention provides a seamless, fibrous pad, having particular utility in imparting a cleansing and mildly stimulating rubbing action to human skin, which pad comprises a seamless edgeless envelope of crimped, stiff, resilient, synthetic organic fibres which are at least 3 cm in length surrounding a core of solid soap or surfactant material, the envelope being held in integral form solely by the interentanglement of said fibres.

The pad need not be highly abrasive and has no unsightly harsh seams or edges to detract from its aesthetic appearance or cause discomfort to the user. It may thus be an attractive addition to the bath or boudoir. The pad normally takes the form of an oblate spheroid and can be of a size and shape which conveniently fits within the palm of the hand of the bather and conforms easily to his or her body contours. The fibrous nature of the pad provides a scrubbing action on the skin which can be pleasantly stimulating as well as beneficial in cleaning the body. One used, the excess soap suds can be easily rinsed from the pad, the water shaken out, and the pad, which is thereafter not slimy, placed in a soap dish for subsequent use.

A method of making a soap- or surfactant-filled pad according to the invention comprises:

(1) shaping a sphere of soap or surfactant material,

(2) surrounding the sphere of soap with a batt of crimped loose stiff, resilient synthetic organic fibres which are each at least 3 cm in length,

(3) needling the fibres together with felting needles to unite them as an integral seamless

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envelope surrounding the sphere of soap or surfactant material; and

(4) shaping the resultant fibre covered sphere to form the pad.

In an alternative method, crimped, loose, stiff, resilient fibres are needled together to unite them into an integral seamless ball, a melted soap or surfactant material being injected or impregnated into the ball and cooled to form a solid core. The resultant fibre covered core is then shaped to form the pad.

The invention will now be described by way of example and with reference to the accompanying drawing wherein:

FIGURE 1 is a perspective view of the pad of the invention; and

FIGURE 2 is a perspective cross-sectional view of the pad of Figure 1.

As shown in Figures 1 and 2, the invention comprises a fibrous pad 10 formed of a seamless envelope 11 of crimped, stiff, resilient, stretchy, synthetic organic fibers which surrounds a solid core 12 of any suitable soap or surfactant material. Envelope 11 is a thick integrated structure formed solely by inter-engagement or inter-entanglement of the fibers.

The soap-filled pad of the invention is preferably shaped as an oblate spheroid, typically between about 5 and 15 cm in average diameter and about 10 and 50 mm in thickness so that it can conveniently fit within the palm of the user. The fibers comprising the envelope may penetrate the soap core somewhat to provide further integrity to the pad but the top should not extend to the outer surface of the pad. The envelope should be at least about 5 mm in thickness and the weight ratio of detergent to envelope should be in the range of about 1:1 to 20:1 to provide the desired cleansing and rubbing action when used as described above.

The fibers comprising the envelope may be any of several water-insoluble synthetic fibers, ranging from acetate rayon and cellulose (which are relatively supple when wetted with water) to nylon, polyester and isotactic polypropylene (which are relatively firm). Fibers such as nylon and polyester may be oriented to provide further resilience and strength. The fiber length should be at least 3 cm to insure their remaining in the envelope. The average diameter of the fiber may vary rather widely from 20 microns to 200 microns, depending upon the expected use of the product. For cleaning hands, polyester or nylon fibers 150 to 200 microns in average diameter, provide effective energetic cleaning, easily cleaning even the most soiled hands such as those of a mechanic. Thinner, more supple fibres, e.g., 20- to 50-micron diameter acetate rayon fibers, are typically used for bathing.

The synthetic fibers may be comprised of polyamides, such as poly(hexamethylene

adipamide), polycaproamide and/or copolymers thereof; polyesters, such as poly(ethylene terephthalate); poly(hexahydro-p-xylylene terephthalate), and/or copolymers; polyolefins, such as polypropylene and polyethylene; polyurethanes, polycarbonates, polyacetals, polyacrylics, vinyl polymers, vinylidene polymers, and the like.

The fibers preferred for the pad of the invention, as previously mentioned, are crimped. Typically, these fibers used will have on the order of 2 to 10 crimps per cm. Crimping enhances the pad resilience and the ability of the fibers to be retained as an integral inter-entangled structure, as herein described.

The concept of fiber crimping is well understood in the art. Crimped fibers can be obtained by well known stuffer box or gear crimping techniques. Crimped fibers are also obtained by orienting them immediately after the preparation thereof and relaxing the drawn fiber while heating. Crimp can also be obtained by use of two-component fibers. Other crimping methods are well known.

Fibers of different polymers and/or different diameters may be used in the same pad to provide, for example, a few coarse fibers among a predominance of fine soft fibers, the former giving a very stimulating feel to the skin of the user while the latter retains water.

The solid soap core utilized in the pad may be any soap or surfactant material suitable for use on human skin. Typical examples of such materials include  $C_{12}$ — $C_{18}$  fatty acid soaps such as those derived from vegetable oil (e.g., coconut oil) acids, tallow, oleic, stearic and palmitic acids, saponified with base such as potassium or sodium hydroxide. The preferred soap compositions are rendered somewhat conformable by the presence of minor amounts (e.g., 5—20% by weight of the total) of plasticizing materials such as glycerol or water.

A pad of the invention may be formed by shaping a small sphere of soap or surfactant material, surrounding it with a batt of crimped loose fibers, and then needling the fibers together to unite them as an integral seamless envelope around the soap. Either staple fibers or a fiber tow may be employed for the formation, but the fibers should be crimped to give the envelope integrity. The resultant product is then pressed to an oblate spheroid configuration.

Alternatively, a ball of loose fibers can be formed into an integral spherical shape by needling, and thereafter melted soap can be injected or impregnated into its interior to form a solid core therein.

The pads of the invention may be made either by hand or by machine utilizing needling to integrate the fibers into an integral inter-entangled continuous envelope which surrounds the soap core. Needling, accomplished by utilizing one or more conventional

felting needles, is predominantly by tangential penetration into the fiber batt which will become the envelope, with minor normal penetration to cause slight entanglement of the envelope with the soap core. Penetration is continued until an integral envelope is formed, generally in less than 5 minutes for one pad, if by hand.

Modifications of the invention can be made without departing from its scope. For example, the fibers may be dyed any of a variety of colors to provide attractive, colorful pads which may be imprinted with, or have interwoven thereon (e.g., by needling), surface indicia or decoration. Additionally, the soap core of the pad may contain perfumes, antibacterial agents, and other substances conventional in soap compositions such as medicaments (e.g., to control acne), emollients, etc.

For use, the pad is simultaneously squeezed and rubbed by hand and, like bar soap, pushed against and rubbed across the body part or object being washed. This squeezing action tends to pump soap solution from the interior of the pad to the washing surface. The fiber crimps scrub the skin at locally higher pressure, and easily dislodge dirt thereby. The absence of any sewn, lapped, cemented and cut seams and edge precludes the user feeling any scratchy harshness when using the pad.

The invention will now be further illustrated by the following examples:

#### Example 1.

About 50 grams of soap, comprised of one part by weight potassium fatty acid mixed vegetable oil (corn oil and cotton seed oil) soap, 2 parts by weight sodium fatty acid mixed vegetable oil (corn oil and cotton seed oil) soap and 0.1 part by weight fragrance, was shaped into a 4 cm diameter sphere. The sphere was wrapped with a batt of loose fibers (about 4 to 5 grams) consisting of crimped 50 denier (having 4—5 crimps per cm) 5-cm polyester staple (polyethylene terephthalate). Needling was accomplished using a bundled felting needle set consisting of twelve slightly dulled chrome-plated felting needles held in a rectangular pattern, approximately  $\frac{1}{4}$  inch (0.6 cm) on centers, 3 rows wide and 4 deep, with each subsequent row projecting about  $\frac{1}{4}$  inch (0.6 cm) above the row in front of it. An integral envelope of entangled fibers was produced after about 250 to 350 punches with the set. The punches were made at an angle of about 30° to the tangent at the center of punching to the gross average curvature of the ball. With each punch, at least some of the needles penetrated slightly into the surface of the soap ball to integrate the core and envelope as an integral structure.

In a similar manner other pads were made using the crimped fibers described in Examples 2—14, as follows:

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Examples 2-14

Ex. No.	Fiber type	Fiber trade designation	Fiber length (cm)	Fiber diameter (microns)	Comments <sup>1</sup>
2.	cellulose acetate staple	"Celanese type HC"	6	62	silky
3.	cellulose flat acetate staple	"Celanese type F"	5	30 x 100	silky
4.	nylon staple	"Nichols-Wellstrand"	7	88	stimulating
5.	nylon staple	"Nichols-Wellon type No. 151"	7	44	moderately stimulating
6.	polyester (polyethylene terephthalate)	"Fiber Industries Inc. type No. 7"	5	40	moderately stimulating
7.	polyester (polyethylene terephthalate)	"Type 61 Dacron"	6	35	silky
8.	viscose rayon	"Enka Rayon Staple"	7	28	silky
9.	polypropylene staple	"Type 101 Herculon"	5	31	silky
10.	polyester staple	"Fiber Industries Inc. No. 7"	13	40	moderately stimulating

<sup>1</sup>. Feel to skin when used for washing the same

## Examples 2-14 continued

Ex. No.	Fiber type	Fiber trade designation	Fiber length (cm)	Fiber diameter (microns)	Comments
11.	polyester tow <sup>1</sup>	"Fiber Industries Inc. No. 7"	13	180	moderately stimulating
12.	nylon staple		5	160	very stimulating
13.	polyester staple	"Fiber Industries Inc. No. 7"	6	23	moderately stimulating
14.	polypropylene staple	"Type 101 Herculon"	4	22	silky

<sup>1</sup>. Fiber tow was loosely uniformly wrapped around the soap ball and thereafter needled to provide an integral envelope.

Following the procedure described in Example 1, Examples 15 and 16 were prepared utilizing soap comprised of 1 part 80% tallow and 20% coconut oil fatty acid soap (sold by "Lever Brothers Inc." under the trade designation "Formula 725") and 1 part coconut oil paste soap (sold by National-Purity Soap Company under the trade designation "Coco Base Paste Soap No. 583") and fibers of "Type 61 Dacron" polyester staple.

## Examples 15-16.

Example No.	15	16
15	Fiber length (cm) 6	5
	Fiber diameter (microns) 35	25
	Soap to fiber weight ratio 10:1	10:1
	Pad weight (gm) 55	55
	Pad diameter (cm) 9	9
	Pad thickness (cm) 3	3
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Following the procedure of Example 1, Examples 17 and 18 were prepared utilizing the soap described for Examples 15 and 16 and polyester (polyethylene terephthalate) fibers.

## Examples 17-18.

Example No.	17	18
25	Fiber length (cm) 10	10
	Fiber diameter (microns) 70	70
	Soap to fiber weight ratio 20:1	1:1
30	Pad weight (gm) 52.5	20
	Pad diameter (cm) 8	9
	Pad thickness (cm) 2	3

## Example 19.

Eleven (11.0) grams of the polyester fibers described in Examples 17 and 18 were needled into an integral envelope, following the pro-

cedure described in Example 1, around a 109 gram cake of medicated skin cleanser (sold under the trade designation "Fostex Cake") to prepare a pad for treatment of acne. "Fostex Cake" cleanser is a medicated bar containing 2% micropulverized sulfur, 2% salicylic acid and other ingredients for treatment of acne.

The words "Celanese" and "Dacron", as used herein are registered Trade Marks.

#### WHAT WE CLAIM IS:—

1. A seamless, fibrous pad, having particular utility in imparting a cleansing and mildly stimulating rubbing action to human skin, which pad comprises a seamless edgeless envelope of crimped, stiff, resilient, synthetic organic fibres which are each at least 3 cm in length surrounding a core of solid soap or surfactant material, the envelope being held in integral form solely by the interentanglement of said fibres.
2. A pad according to Claim 1 wherein the thickness of the envelope wall lying outward from the core is at least 5 mm.
3. A pad according to Claim 1 or Claim 2 wherein said fibres are 20 to 200 microns in average diameter.
4. A pad according to any preceding claim wherein said fibres are selected from the group consisting of nylon, polyester and polypropylene.
5. A pad according to any preceding Claim wherein the weight ratio of the core to the envelope is in the range of 1:1 to 20:1.
6. A pad according to any preceding Claim in the form of an oblate spheroid.
7. A pad according to any preceding Claim wherein the core comprises soap.
8. A pad according to any preceding Claim wherein the core contains a medicament.
9. A seamless, fibrous pad substantially as described herein with reference to the accompanying drawing.
10. A seamless fibrous pad substantially as

described herein with reference to the examples.

11. A method of making a seamless, fibrous soap- or surfactant-filled pad comprising:

(1) shaping a sphere of soap or surfactant material,

(2) surrounding the sphere of soap with a batt of crimped loose stiff, resilient synthetic organic fibres which are each at least 3 cm in length,

(3) needling the fibres together with felting needles to unite them as an integral seamless envelope surrounding the sphere of soap or surfactant material; and

(4) shaping the resultant fibre covered sphere to form the pad.

12. A method according to Claim 11 wherein the needling is predominantly by tangential penetration of said felting needles into said fibre batt.

13. A method according to Claim 11 or Claim 12 wherein the needling includes minor penetration by the felting needles into the surface of the sphere.

14. A method of making a seamless fibrous soap- or surfactant-filled pad comprising needling crimped, loose, stiff, resilient fibres to unite them into an integral seamless ball; injecting or impregnating the ball so formed with a melted soap or surfactant material to form, upon cooling, a solid core in the interior thereof; and shaping the resultant fibre-covered core to form the pad.

15. A method according to any of Claims 11 to 14 wherein the pad is shaped to form an oblate spheroid.

16. A method of making soap- or surfactant-filled pads substantially as herein described.

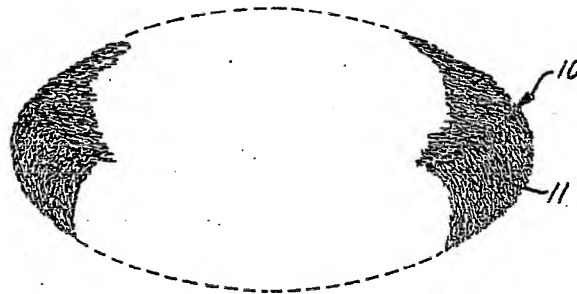
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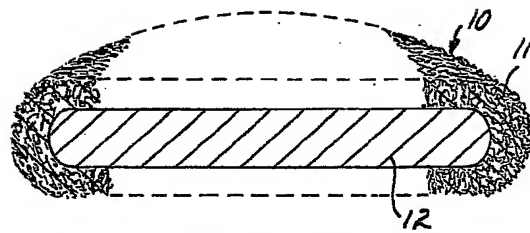
COMPLETE SPECIFICATION

1 SHEET

This drawing is a reproduction of  
the Original on a reduced scale



**FIG. 1**



**FIG. 2**